Problem 1

Let (x, y) be the outcome of throwing a pair of dice.

Sum of eight

favorable outcomes:

$(2, 6), (6, 2), (3, 5), (5, 3)$, and $(4, 4)$.

$h = 5$

Total number of ordered pairs: $n = 6\ (6) = 36$

$$p = \frac{5}{36}$$

		die no. 1					
		1	**2**	**3**	**4**	**5**	**6**
die no. 2	**1**	1 + 1 = 2	2 + 1 = 3	3 + 1 = 4	4 + 1 = 5	5 + 1 = 6	6 + 1 = 7
	2	1 + 2 = 3	2 + 2 = 4	3 + 2 = 5	4 + 2 = 6	5 + 2 = 7	**6 + 2 = 8**
	3	1 + 3 = 4	2 + 3 = 5	3 + 3 = 6	4 + 3 = 7	**5 + 3 = 8**	6 + 3 = 9
	4	1 + 4 = 5	2 + 4 = 6	3 + 4 = 7	**4 + 4 = 8**	5 + 4 = 9	6 + 4 = 10
	5	1 + 5 = 6	2 + 5 = 7	**3 + 5 = 8**	4 + 5 = 9	5 + 5 = 10	6 + 5 = 11
	6	1 + 6 = 7	**2 + 6 = 8**	3 + 6 = 9	4 + 6 = 10	5 + 6 = 11	6 + 6 = 12

$$C(x,y) := \text{combin}(x,y) \quad 0.70\ (75) = 52.5$$

$$\sum_{x=53}^{75} \left(C(75,x)\ (0.25)^{x}\ (0.75)^{75-x}\right) = 1.312 \cdot 10^{-16}$$

Problem No. 2

$$p = \left(\frac{5}{9}\right)\left(\frac{1}{2}\right)\left(\frac{2}{6}\right) = \frac{5}{54}$$

Problem No. 3

Bag No. 1: $4\,W$ *&* $2\,B$

Bag No. 2: $3\,W$ *&* $5\,B$

(a) both are white

$$\mathrm{p} = \left(\frac{4}{4+2}\right)\left(\frac{3}{3+5}\right) = \frac{1}{4}$$

(b) both are black

$$\mathrm{p} = \left(\frac{2}{4+2}\right)\left(\frac{5}{3+5}\right) = \frac{5}{24}$$

(c) 1 is white and 1 is black

Event 1: *probability to get a white from Bag no.* 1 *and a black from Bag no.* 2

$$p_1 = \left(\frac{4}{6}\right)\left(\frac{5}{8}\right) = \frac{5}{12}$$

Event 2: *probability to get a white from Bag no.* 2 *and a black from Bag no.* 1

$$p_2 = \left(\frac{3}{8}\right)\left(\frac{2}{6}\right) = \frac{1}{8}$$

Probability for Event 1 or Event 2 to take place.

$$\mathrm{p} = p_1 + p_2 = \frac{5}{12} + \frac{1}{8} = \frac{13}{24}$$

Problem No. 4

at least 1 one in 2 throws of a die

$$\text{p(one)} = \frac{1}{6} \qquad \text{p(not a one)} = \frac{5}{6}$$

$$\textit{Event 1:}\ \text{p(one)} \times \text{p(not a one)} = \frac{1}{6}\left(\frac{5}{6}\right) = \frac{5}{36}$$

$$\textit{Event 2:}\ \text{p(not a one)} \times \text{p(one)} = \frac{5}{6}\left(\frac{1}{6}\right) = \frac{5}{36}$$

$$\textit{Event 3:}\ \text{p(one)} \times \text{p(one)} = \frac{1}{6}\left(\frac{1}{6}\right) = \frac{1}{36}$$

$$\text{P} = \frac{5}{36} + \frac{5}{36} + \frac{1}{36} = \frac{11}{36}$$

what if: Probability of getting 1 one in 2 throws of a die.

$$\text{p(not a one)} \times \text{p(not a one)} = \frac{5}{6}\left(\frac{5}{6}\right) \rightarrow \frac{25}{36}$$

$$\text{S} = \frac{5}{36} + \frac{5}{36} + \frac{1}{36} + \frac{25}{36} = 1$$

$P = 1 - Q$

total failure: both are not a one.

$$p(\text{not a one}) \times p(\text{not a one}) = \frac{5}{6}\left(\frac{5}{6}\right) = \frac{25}{36}$$

$$P = 1 - \frac{25}{36} = \frac{11}{36}$$

3 games:

$P = 1 - Q$

$$Q = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right) = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$$

$$P = 1 - \frac{8}{27} = \frac{19}{27}$$

ABB or BAB or BBA or AAB or ABA or BAA or AAA.

$$p = \frac{1}{3}\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)(3) + \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{2}{3}\right)(3) + \left(\frac{1}{3}\right)^3 = \frac{19}{27}$$

What IF?

What is the probability that A will win at least 2 of a total of 3 games.

$$p = \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{2}{3}\right)(3) + \left(\frac{1}{3}\right)^3 = \frac{7}{27}$$

Problem No. 6

The problem will be solved if at least one of them could solve the problem.

$P = 1 - Q$

Q = *probability that each of them could not solve the problem*

$$Q = \frac{1}{5}\left(\frac{1}{3}\right)\left(\frac{4}{7}\right) = \frac{4}{105}$$

$$\mathrm{P} = 1 - \frac{4}{105} = \frac{101}{105} = 0.962$$

$P(n,r) := \text{permut}(n,r)$

ABC

ABC, ACB, BAC, BCA, CAB, CBA
P = 3! = 6
AB, BA, AC, CA, AB, BA
$3P2 = P(3,2) = 6 \quad = \frac{3!}{(3-2)!} = 6$

ABC, ACB, BAC, BCA, CAB, CBA are one combination.
AB and BA are 1 count, AC and CA are 1,
$3C2 = C(3,2) = 3$

$$\text{Number of ways} = 4\ (6)\ (2) = 48$$

$$\text{Number of ways} = 38\ (37)\ (36) = 50616$$
$$\text{Number of ways} = 38\text{P}3 = P(38,3) = 50616$$

$$\text{Number of ways} = 17\text{C}4 = C(17,4) = 2380$$

$$17\text{P}4 = 17\ (16)\ (15)\ (14) = 57120$$
$$17\text{P}4 = P(17,4) = 57120$$

$$17\text{C}4 = \frac{17\ (16)\ (15)\ (14)}{4!} = 2380$$
$$17\text{C}4 = C(17,4) = 2380$$

$N = (26)\ (26)\ (10)\ (10)\ (10) = 676000$

$N = (2) \times P(6,3) = 240$

the (2) comes from choosing either 3 or 4 in order for the number to be between 3000 and 5000. OK?

$N = 2\ (6)\ (5)\ (4) = 240$

suppose the digit may be repeated

$N = 2 \cdot (7)\ (7)\ (7) = 686$

$N = 5\ (4)\ (3)\ (2)\ (1) = 120$

$N = 5! = 120$

BREAK NA TAYO!!!

BRB @10AM

Problem No. ##

(a) $N = 3!\ (1+6)! = 30240$

$N = 3!\ (\ 1\ +6\ )!$

$N = 3!\ 6! = 4320$

*ABC*DEFGHI
DE*ABC*FGHI
DEFG*CAB*HI

D*ABC*EFGHI
DEFG*ABC*HI

*ABC*DEFGHI
*ACB*DEFGHI
*BAC*DEFGHI
*BCA*DEFGHI
*CAB*DEFGHI
*CBA*DEFGHI

(b) $9! = 362880$

$N = 362880 - 30240 = 332640$

*A*D*B*E*C*GHI

$\mathrm{N} = 3\ P(11,4) = 23760$

$N = C(11,4)\ (3)\ (4!) = 23760$

$D_1\ D_2 D_3$
$N_1 N_2 N_3 \ldots N_{11}$

$N_1 \quad N_3 \quad D_1 \quad N_8 \quad N_2$

What if the dictionary maybe placed anywhere?

$N = C(11,4)\ (3)\ (5!) = 118800$

$\mathrm{N} = C(6,4)\ C(5,3) = 150$

if 4 are chemists the other 3 (to form a 7−man committee) must be from the biologists.

BCDFGHJK

AEIO

N = 8P3 x 4P2 −(wrong ni uy)

N = $C(8,3)\ C(4,2)\ (5!)$=40320
BCDAO
BACDO
BODAC
BADOC

If 3 appliances are chosen out of 4.
$4\mathrm{C}3 = C(4,3) = 4$

one or more.
one or two or three or four.

$\mathrm{N} = n_1 + n_2 + n_3 + \ldots + n_l$
$\mathrm{N} = 4\mathrm{C}1 + 4\mathrm{C}2 + 4\mathrm{C}3 + 4\mathrm{C}4$
$\mathrm{N} = C(4,1) + C(4,2) + C(4,3) + C(4,4) = 15$

$\mathrm{N} = 5\mathrm{P}1 + 5\mathrm{P}2 + 5\mathrm{P}3 + 5\mathrm{P}4 + 5\mathrm{P}5$
$\mathrm{n} = P(5,1) + P(5,2) + P(5,3) + P(5,4) + P(5,5)$
$\mathrm{N} = 325$

Problem
At least 1 vowel

1 Capital, 1 vowel, & 2 consonants or
1 Capital, 2 vowels, & 1 consonant or
1 Capital, 3 vowels, & no consonant

1 *Capital*, 1 *vowel*, *&* 2 *consonants*

$n_1 = 7\ C(3,1)\ C(5,2)\ (3!) = 1260$

City
Ctiy
Cyti
Cyti

1 *Capital*, 2 *vowels*, *&* 1 *consonant*

$n_2 = 7\ C(3,2)\ C(5,1)\ 3! = 630$

1 *Capital*, 3 *vowels*, *&* *no consonant*

$n_3 = 7\ (3!) = 42$ or $7\ C(3,3)\ 3! = 42$

or $7\ P(3,3) = 42$

$N = 1260 + 630 + 42 = 1932$

favorable outcome

$(1, 2, 3), (2, 3, 4), (3, 4, 5)$ .., $(7, 8, 9)$

$h = 7$

$\mathrm{n} = C(9,3) = 84$

$\mathrm{p} = \frac{7}{84} = \frac{1}{12}$

$\mathrm{n} = 6! = 720$

(a)

$h = 3\ (5!) = 360$ *vloemu*

$\mathrm{p} = \frac{360}{720} = 0.5$

(b)

$h = 3\ (3)\ (4!) = 216$

$\mathrm{p} = \frac{216}{720} = 0.3$

silicates problem

5 S, 7 P, 8 C (total of $5+7+8=20$ rocks)

$n = C(20,6) = 38760$

(*a*) 2 *S*, 1 *P*, 3 *C*

$h = 5C2 \times 7 \times 8C3$

$h = C(5,2)\ (7)\ C(8,3) = 3920$

$$\mathrm{P} = \frac{3920}{38760} \rightarrow \frac{98}{969} = 0.1011 \quad \text{or } 10.11\%$$

(*b*) 2 *Silicates* (*and* 4 *non–Silicates*)

$h = 5C2 \times 15C4$

$h = C(5,2)\ C(15,4) = 13650$

$$\mathrm{P} = \frac{13650}{38760} \rightarrow \frac{455}{1292} = 0.3522 \quad \text{or } 35.22\%$$

(*c*) 2*S and* 3*P* (*and* 1 *C*)

$h = 5C2 \times 7C3 \times 8C1$

$h = C(5,2)\ C(7,3)\ (8) = 2800$

$$\mathrm{P} = \frac{2800}{38760} \rightarrow \frac{70}{969} = 0.0722 \quad \text{or } 7.22\%$$

$n = 11! = 39916800$
$h = 5!\ 4!\ 2!\ 3! = 34560$

$$\mathrm{P} = \frac{34560}{39916800} \rightarrow \frac{1}{1155}$$

$\mathrm{n} = 9! = 362880$???

Permutation with some things are alike

BANANA

$\mathrm{n} = 6! = 720$ wrong

$$\mathrm{n} = \frac{6!}{1!\ 3!\ 2!} = 60$$

The number of permutations P of n things taken all at a time, of which n_1 are alike, n_2 others are alike, n_3 others are alike, etc., is

$$\mathrm{P} = \frac{n!}{n_1!\ n_2!\ n_3! \ldots}$$

R R W W R R W W R
R W R W R R W W R
R W R W R W R W R

$$n = \frac{9!}{5!\ 4!} = 126$$

$$h = \frac{7!}{3!\ 4!} = 35$$

$$p = \frac{35}{126} \rightarrow \frac{5}{18}$$

What is the probability sir of winning in lotto?
6–45 Lotto

$$n = C(45,6) = 8145060$$

$$p = \frac{1}{C(45,6)} \rightarrow \frac{1}{8145060}$$

$8145060\ (20)$